

## **Dynamics of the Vietnamese Shelf and Slope**

Kenneth H. Brink  
Mail Stop 21  
Woods Hole Oceanographic Institution  
Woods Hole, MA 02543  
Phone: 508 289 2535      Fax: 508 457 2181      Email: [kbrink@whoi.edu](mailto:kbrink@whoi.edu)

David C. Chapman  
Mail Stop 21  
Woods Hole Oceanographic Institution  
Woods Hole, MA 02543  
Phone: 508 289 2792      Fax: 508 457 2181      Email: [dchapman@whoi.edu](mailto:dchapman@whoi.edu)

R. Kipp Shearman  
Mail Stop 21  
Woods Hole Oceanographic Institution  
Woods Hole, MA 02543  
Phone: 508 289 3346      Fax: 508 457 2181      Email: [kshearman@whoi.edu](mailto:kshearman@whoi.edu)

Award Number N00014-02-1-0767  
[http://www.whoi.edu/PO/working\\_groups/workinggroup\\_season.htm](http://www.whoi.edu/PO/working_groups/workinggroup_season.htm)

### **LONG-TERM GOALS**

We want to test our dynamical understanding of coastal currents by comparing conceptual and numerical models with highly resolved ocean observations.

### **OBJECTIVES**

We seek to understand the dynamical processes that govern flow over the Vietnamese shelf and slope by use of observations (*in situ* and remote) and process-oriented numerical models.

### **APPROACH**

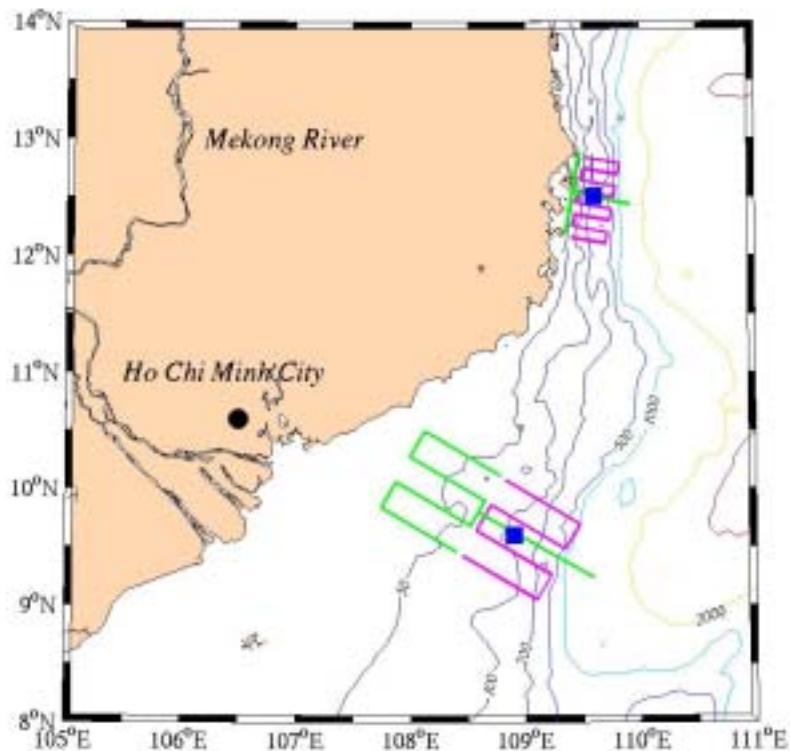
Observations (Brink and Shearman, leaders): In collaboration with Vietnamese scientists, we will carry out two seagoing efforts during 2003. Much of the thinking to date relies on observations reported by Wyrski (1961).

We hypothesize that, during the winter (northeast) monsoon, flow over the shelf will be dominated by buoyancy-driven currents associated with runoff from the land. We expect that there will be pronounced fronts over the midshelf (associated with local rivers), and another near the shelf edge that would be analogous with the shelfbreak front in the Middle Atlantic Bight (e.g., Linder and Gawarkiewicz, 1998). Both fronts are expected to be highly variable due to wind fluctuations and instabilities. Our February seagoing work will involve two ships, the R/V *Thompson* and the Vietnamese R/V *Nghien Cuu Bien*. Both will carry out station hydrography, and towed, undulating

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE <b>30 SEP 2002</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-2002 to 00-00-2002</b>	
4. TITLE AND SUBTITLE <b>Dynamics of the Vietnamese Shelf and Slope</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Woods Hole Oceanographic Institution,,Woods Hole,,MA, 02543</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT <b>We want to test our dynamical understanding of coastal currents by comparing conceptual and numerical models with highly resolved ocean observations.</b>					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

body (SeaSoar or Minibat, respectively) measurements. Repeated, well-resolved surveys will be carried out in order to characterize the modes of variability. Both the wide shelf near 10°N and the very narrow shelf near 12°N will be sampled (figure 1) in order to detect variations associated with topography.

We hypothesize that during the southwest (summer) monsoon, there will be active wind-driven upwelling over the shelf, and that buoyancy-driven currents will be of secondary importance. We expect to observe cool surface filaments, such as those seen off California (e.g., Brink and Cowles, 1991). The summer cruise will involve one ship (the R/V *T.G. Thompson*), and will concentrate on SeaSoar and station observations, the structure of coastal upwelling, of the upwelling front, and of filamentary structures offshore of the shelfbreak. Repeated sampling will again be used to characterize, thoroughly, time variations. Again, sampling will take place off of both southern and central Vietnam.



**Figure 1: Proposed sampling areas off of Vietnam. The green tracks will be sampled in February 2003 by the R/V *Nghien Cuu Bien* and the cyan tracks by the R/V *Thompson*. During Summer, 2003, the R/V *Melville* will sample both areas. Cruise tracks shown are schematic and only meant to signify the general areas to be studied.**

Modeling (Chapman, leader): Our plan of attack is to examine the response of the shelf and slope regions to forcing by winds, river outflows and remote processes, applied individually and then in combination. We will use the Regional Ocean Model System (ROMS) from the Rutgers University group. This is a well-tested model that incorporates sophisticated advection schemes and a flexible topography-following s-coordinate in the vertical. We will configure the model with realistic coastline and bottom topography and apply both idealized and realistic forcings.

## **WORK COMPLETED**

In preparation for the 2003 cruises, we have started the process of upgrading our SeaSoar equipment and software. In addition, Shearman has visited Vietnam in order to begin cooperation with Vietnamese oceanographers.

## **RESULTS**

None to date.

## **IMPACT/APPLICATIONS**

The Vietnamese coastal region represents an opportunity to test *a priori* predictions about currents and hydrography in a coastal region subject to strong river runoffs and monsoonal forcing. Our observations will thus be a test of the depth of our current understanding. Further, we expect to build bridges to the Vietnamese oceanographic community and to exchange expertise with them.

## **TRANSITIONS**

None to date.

## **RELATED PROJECTS**

None.

## **REFERENCES**

Brink, K.H. and T. J. Cowles, 1991. The Coastal Transition Zone program. *J. Geophys Res.*, **96**, 14637-14647.

Linder, C. and G. Gawarkiewicz, 1998. A climatology of the shelfbreak front in the Middle Atlantic Bight. *J. Geophys. Res.*, **103**, 18405-18423.

Wyrski, Klaus, 1961. NAGA Report, Scientific Results of Marine Investigations of the South China Sea and the Gulf of Thailand, 1959-1961. *The University of California, Scripps Institution of Oceanography, La Jolla, CA*. 195 pp.